

ORIGINAL



EX PARTE OR LATE FILED

December 13, 1999

Ms. Magalie Roman Salas, Secretary
Federal Communications Commission
The Portals, TW-A325
445 12th Street, S.W.
Washington, D.C. 20554

RECEIVED
DEC 13 1999
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Re: Ex Parte Notification - WT Docket 99-168
WT Docket 96-86

Dear Ms. Salas:

This letter provides additional information on rules required to protect the 700 MHz public safety bands while maximizing the potential for commercial operations in the 36 MHz of spectrum under consideration in this proceeding.

There are three intersections between the commercial use spectrum under consideration in this proceeding and the 24 MHz of spectrum at 746-776 MHz and 794-806 MHz that was previously allotted for public safety. Motorola has provided extensive information describing the need to provide 1.5 MHz-wide bands at each of these intersections for Private Mobile Radio Services (PRMS), which are compatible with the adjacent public safety operations, thereby providing the protection necessary while allowing efficient use of the spectrum. It is also important that appropriate emission limits be set at the edges of the public safety spectrum to protect public safety operations from interference from the wide bandwidth, low site, high frequency reuse Commercial Mobile Radio Service (CMRS) operations that are likely to be deployed in the remaining 30 MHz of spectrum under consideration.

In an Ex Parte letter filed December 6, 1999 Motorola addressed a proposal filed by US West.¹ Consistent with Motorola's proposal, U.S. West proposed a plan that sets aside 1.5 MHz of spectrum at the edges of the spectrum under consideration in this proceeding in order to provide protection to public safety. The U.S. West proposal provides for licensing the remaining 30 MHz of spectrum in one 2x5 MHz license and one 2x10 MHz license. Motorola's December 6 filing discussed the need to limit the

¹ See Letter from Leigh Chinitz to Magalie Salas, December 6, 1999.

commercial mobile station transmitter's absolute coupled power in the public safety mobile receive band to less than -75 dBm. We also said that, based on the emission mask for W-CDMA defined by 3GPP, it does not appear possible to meet this level given the current band configuration for the public safety services. Motorola suggested that a "reversed" band plan would provide better protection for public safety services, while allowing deployment of 3G technologies, such as W-CDMA, in the 30 MHz of spectrum that would be available for CMRS services. After further analysis, we conclude that reversing the mobile and base transmit and receive bands, as shown in attachment 1, is the best method to achieve these objectives.²

It must be recognized that operating public safety systems in such close frequency proximity to commercial 3G systems presents unique and challenging interference scenarios. Given the limited spectrum available, these challenges are present regardless of how the band is configured, however, we feel confident that the attached plan provides the greatest potential for overcoming these challenges and allowing operation of public safety, PMRS, and CMRS systems.

Based on the attached plan, we must now consider a number of different interference scenarios. In an Ex Parte filing made December 2, 1999, Motorola provided justification for limiting the energy from CMRS base stations into the public safety mobile receive bands to -57 dBm per 6.25 kHz.³ This situation still exists with the reversed band plan, however, the limit would now be applied at 794 MHz rather than 764 MHz. Accordingly, the energy from CMRS base transmitters operating at 777.5 - 792.5 MHz would be limited to -57 dBm/6.25 kHz or less in the 794-806 MHz band. This is an extremely important intersection given the large number of CMRS base stations generally deployed for a cellular type of system and the random movement of public safety mobile operations. In order to assure reliable communications for public safety personnel regardless of where an emergency occurs, it is important that public safety mobile receivers be fully protected from interference. Any reduction in this protection value will result in an unacceptable decrease in the reliability of public safety communications.

We must also consider interference from CMRS base stations transmitting at 777.5-792.5 MHz into public safety base stations receiving at 764-776 MHz. This is a somewhat different case from the base-to-mobile case just discussed. In determining the protection level required in the base-to-mobile case the path loss was determined through real-world site isolation measurements. These measurements included the effect of

² Motorola notes that the frequency bands designated for public safety base and mobile transmissions are not at issue in this proceeding but, instead, are under consideration in WT Docket No. 96-86. See, First Report and Order and Third Notice of Proposed Rule Making, WT Docket No. 96-86, FCC 98-191, released September 29, 1998 (First Report and Order). There remain pending petitions for reconsideration that have asked the FCC to reconsider its adopted standard for base and mobile transmissions so as to reverse the designations as proposed here by Motorola. See e.g. Petition for Reconsideration and Clarification, filed by the Federal Law Enforcement Wireless Users Group, WT Docket No. 96-86, submitted December 2, 1998.

³ See Letter from Leigh Chinitz to Magalie Salas, December 2, 1999.

typical transmitter and receiver antenna gain as well as non-line-of-site paths and multipath. In the base-to-base case, it can be expected that direct line-of-site interference will have a higher probability of occurrence and that the transmit and receive base station antennas may align in such a way as to maximize the interference. Accordingly, to achieve the same effective protection as in the base-to-mobile case would require an emission limit that greatly exceeds the -57 dBm required in the base-to-mobile case. However, a value that provides equivalent protection would be significantly below the noise floor of the CMRS power amplifier and would dramatically limit or eliminate any use of the CMRS band for W-CDMA. Because we are now talking about interference between two fixed points, it should be possible to avoid such worst case interference conditions with cooperation between the licensees through antenna relocation, using down tilt on CMRS antennas, and using voting receive sites for public safety systems. Accordingly, we recommend that emissions from CMRS base stations transmitting at 777.5-792.5 MHz be limited to -62 dBm per 6.25 kHz in the 764-776 MHz band. The limit will enhance the viability of CMRS equipment in the band and, while we are still evaluating the potential for W-CDMA systems operating at this level to cause interference to public safety base stations, and the extent to which mitigation techniques can eliminate this potential, we believe that the interference issues can be resolved. However, to allow this level of emission while ensuring interference-free public safety operations, we recommend a requirement that licenses operating in the 777.5-792.5 MHz band be required to work with public safety operators to resolve instances of interference.

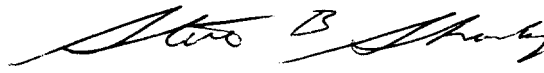
We must now consider the interference from CMRS mobile stations transmitting at 747.5 MHz–762.5 MHz into public safety base stations at 764-776 MHz. Based on the performance requirements for a W-CDMA mobile adopted by 3GPP, a W-CDMA carrier centered 5.5 MHz from the public safety band would produce an out-of-band emission of -35 dBm/6.25 kHz at the edge of the public safety band. While this is significantly short of the -57 dBm limit we have proposed for the case of CMRS base stations into public safety mobile stations, we believe that other factors mitigate the potential for interference and that -35 dBm is an acceptable value. First, public safety base stations are generally mounted higher than CMRS base stations in order to provide coverage over large areas and far fewer public safety base station are used to cover an area than for a cellular-type network. This will provide greater path loss between the mobile and base, thereby reducing the received interference and the smaller number of base stations will reduce the probability of interference. Additional signal attenuation can also be expected because of the operating environment for CMRS portable units. In urban areas, significant isolation is likely because of building blockage, while in suburban and rural areas, much of the CMRS use is from inside of vehicles, which provide 5-10 dB of additional isolation. CDMA systems also employ handset power control, which will likely result in actual out-of-band emissions that are below -35 dBm. Accordingly, we believe that the actual probability of interference from a CMRS mobile to a public safety base station is very low and that, should any actual interference occur, it would likely be very transient in nature. In addition, measures such as voting receivers for public safety systems, which add site diversity, would greatly reduce the potential for interference from a CMRS user to block an emergency call. Motorola is conducting a detailed probability analysis to verify these assumptions, however, such detailed analysis of a problem with such a large

number of variables will take considerable time. Given the short time required for Commission action, we believe that it is appropriate for the Commission to move forward with the -35 dBm per 6.25 kHz protection. Again, this will enhance the viability of implementing CMRS services while providing adequate protection to public safety operations.

As stated in our December 6 filing, the US West band plan, with the base and mobile transmit and receive allotments reversed as described above, will provide for two W-CDMA carriers and at least two CDMAone carriers to be deployed in this spectrum and on other plan would allow for deployment of more CDMA carriers.

For the convenience of the Commission, draft rules implementing the limits we are proposing are included as Attachment 2. If you have any questions regarding this filing, or require additional information, please contact me at (202) 371-6953.

Sincerely,

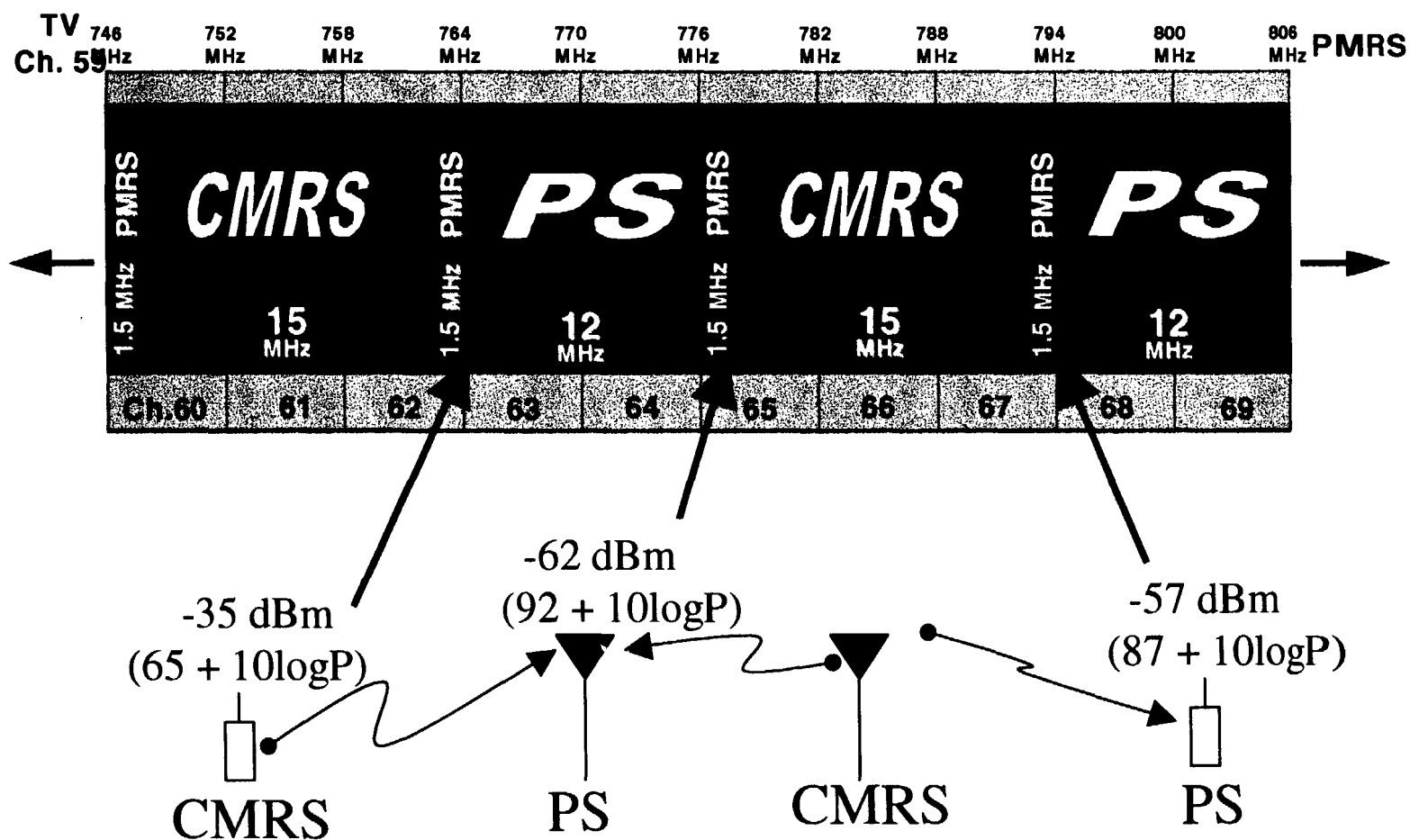
A handwritten signature in black ink, appearing to read "Steve B. Sharkey", with a stylized flourish at the end.

Steve B. Sharkey

Cc:
James Schlichting
Martin Liebman
Jay Jackson
Julius Knapp
Herbert Zeiler



Attachment 1 - Band Plan



Attachment 2 - Rules

APPENDIX XXX

FINAL RULES FOR REPORT AND ORDER

Part 27 of Chapter 1 of Title 47 of the Code of Federal Regulations is amended as follows:

1. The authority citation for Part 27 is revised to read as follows:

AUTHORITY: 47 U.S.C. 154, 301, 302, 303, 307, 309, 332, 336 and 337, unless otherwise noted.

2. Section 27.1 is amended by revising paragraph (b) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(a) * * *

(b) Purpose. This part states the conditions under which the 746-764 MHz, 776-794 MHz, 2305-2320 MHz and 2345-2360 MHz bands are made available and licensed for the provision of WCS.

* * * * *

3. Section 27.50 is amended by redesignating paragraph (c) as paragraph (g) and adding new paragraphs (c), (d), (e) and (f) to read as follows:

§ 27.50 Power limits.

* * * * *

(c) Fixed land stations transmitting in the 776 to 777.5 MHz and 792.5 to 794 MHz bands must follow the power and height restrictions found in § 90.635.

(d) Fixed land stations transmitting in the 777.5 to 792.5 MHz band are limited to 1000 watts effective radiated power (ERP).

(e) Mobile stations transmitting in the 746 to 747.5 MHz and 762.5 to 764 MHz bands are limited to a maximum of 30 watts output power.

(f) Mobile stations transmitting in the 747.5 to 762.5 MHz band are limited to 7 watts ERP peak power.

(g) Peak transmit power shall be measured over any interval of continuous transmission using instrumentation calibrated in terms of rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

4. Section 27.53 is amended by revising paragraph (a), redesignating paragraph (c) as paragraph (f) and adding new paragraphs (c), (d), and (e) to read as follows:

§ 27.53 Emission limits.

(a) For operations in the bands 2305-2320 MHz and 2345-2360 MHz, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (p) within the licensed band(s) of operation, measured in watts, by the following amounts:

* * * * *

(c) For operations in the 747.5 to 762.5 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (p) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside 747.5 to 762.5 MHz, the power of any emission shall be attenuated outside the block below the transmitter power (p) by at least $43 + 10 \log (P)$ dB;

(2) By a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz measurement bandwidth on all frequencies between 764 to 776 MHz;

(3) Compliance with the provision of section (c)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(5) Compliance with the provisions of sections (c)(2) and (c)(3) is based on the use of measurement instrumentation employing a resolution bandwidth of 6.25 kHz.

(d) For operations in the 777.5 to 792.5 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (p) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside 777.5 to 792.5 MHz, the power of any emission shall be attenuated outside the block below the transmitter power (p) by at least $43 + 10 \log (P)$ dB;

(2) By a factor not less than $92 + 10 \log (P)$ dB in a 6.25 kHz measurement bandwidth on all frequencies between 764 to 776 MHz;

(3) By a factor not less than $87 + 10 \log (P)$ dB in a 6.25 kHz measurement bandwidth on all frequencies between 764 to 776 MHz;

(4) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(e) Transmitters designed to operate in 746 to 747.5 MHz, 762.5 to 764 MHz, 776 to 777.5 MHz and 792.5 to 794 MHz frequency bands must meet the emission limitations found in Section 90.543 of this chapter.

(f) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

5. A new Section 27.60 is added to read as follows:

§ 27.60 Frequency coordination requirements for the 746 to 806 MHz band.

(a) Licensees in the bands 746 to 747.5 MHz, 762.5 to 764 MHz, 776 to 777.5 MHz and 792.5 to 794 MHz must develop frequency coordination procedures in cooperation with the FCC's designated frequency coordinator of the public safety allocation at 764-776/794-806 MHz in order to protect public safety operations. At its discretion, the FCC may request that licensees in the bands 746 to 747.5 MHz, 762.5 to 764 MHz, 776 to 777.5 MHz and 792.5 to 794 MHz provide documentation to the Commission on the developed procedures on a case-by-case basis. In addition, licensees in the bands 746 to 747.5 MHz, 762.5 to 764 MHz, 776 to 777.5 MHz and 792.5 to 794 MHz are required to cooperate in the selection and use of frequencies in order to reduce interference and are required to cooperate to resolve any interference through mutually satisfactory arrangements.

(b) Licensees in the 747.5 MHz to 762.5 MHz and the 777.5 MHz to 792.5 MHz bands must cooperate with public safety entities operating in the 764-776 MHz and 794 MHz to 806 MHz bands to resolve any complaints of interference in a timely manner.

Part 90 of Chapter 1 of Title 47 of the Code of Federal Regulations is amended as follows:

6. The authority citation for Part 90 continues to read as follows:

AUTHORITY: Secs. 4, 251-2, 303, 309, 332 and 337, 48 Stat 1066, 1082, as amended; 47 U.S.C. 154, 251-2, 303, 309 and 337, unless otherwise noted.

7. Section 90.543 is amended by revising the introductory sentence as to read as follows:

§ 90.543 Emission limitations.

Transmitters designed to operate in the 764-776 MHz, 794-806 MHz, 746.0-747.5 MHz, 762.5-764.0 MHz, 776-777.5 MHz and 7932.5-794 MHz frequency bands must meet the emission limitations in this section.
